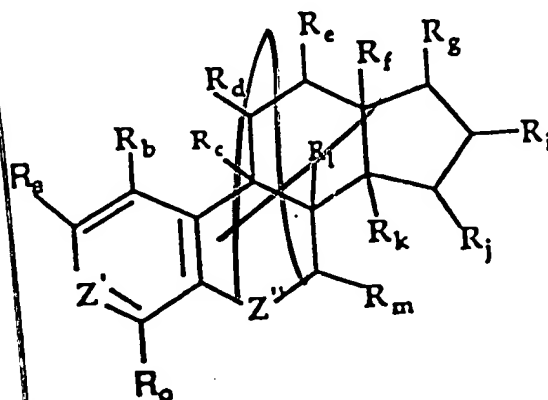


Claims

- 1 1. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
5 being administered in an amount sufficient to inhibit cell
6 mitosis:

7



8 wherein:

- 9 I. R_a-R_o are defined as follows:
10 A) each R_a, R_b, R_c, R_d, R_e, R_f, R_g, R_h, R_i, R_j, R_k, R_l,
11 R_m, R_o, independently is -R₁, -OR₁,

12 $-\text{OCOR}_1$, $-\text{SR}_1$, $-\text{F}$, $-\text{NHR}_2$, $-\text{Br}$, or $-\text{I}$; and R_g
 13 is $-\text{R}_1$, $-\text{OR}_1$, $-\text{OCOR}_1$, $-\text{SR}_1$, $-\text{F}$, $-\text{NHR}_2$, $-\text{Br}$,
 14 $-\text{I}$, or $-\text{C}\equiv\text{CH}$;

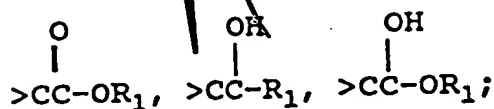
15 or

16 B) each R_a , R_b , R_c , R_f , R_k , R_l , R_o ,
 17 independently is $-\text{R}_1$, $-\text{OR}_1$, $-\text{OCOR}_1$, $-\text{SR}_1$,
 18 $-\text{F}$, $-\text{NHR}_2$, $-\text{Br}$, or $-\text{I}$; and each R_d , R_e , R_i ,
 19 R_j , R_m , independently is $=\text{O}$, $-\text{R}_1$, $-\text{OR}_1$,
 20 $-\text{OCOR}_1$, $-\text{SR}_1$, $-\text{F}$, $-\text{NHR}_2$, $-\text{Br}$ or $-\text{I}$; and R_g
 21 is $=\text{O}$, $-\text{R}_1$, $-\text{OR}_1$, $-\text{OCOR}_1$, $-\text{SR}_1$, $-\text{F}$, $-\text{NHR}_2$,
 22 $-\text{Br}$, $-\text{I}$, or $-\text{C}\equiv\text{CH}$;

23 and

24 II. Z' is defined as follows:

25 A) Z' is X , where X is $>\text{COR}_1$, $>\overset{\text{O}}{\text{CC}}-\text{R}_1$,
 26
 27



31 or

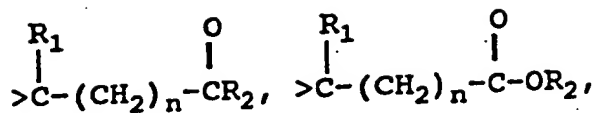
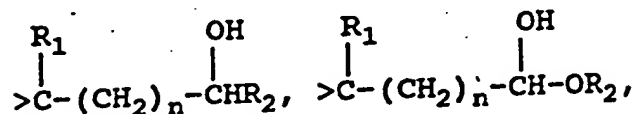
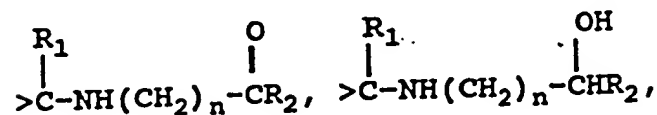
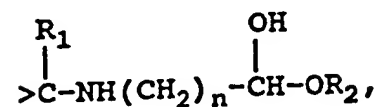
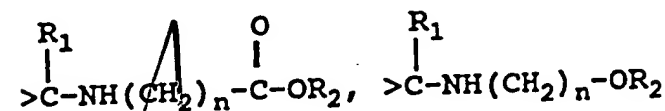
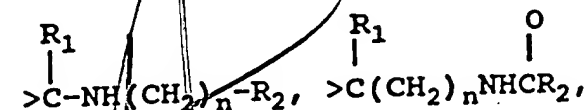
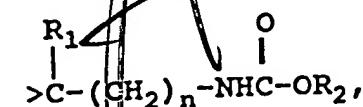
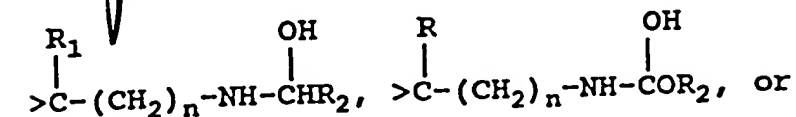
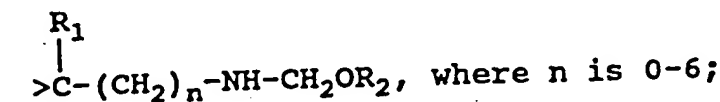
32 B) Z' is $=\underset{\text{R}_n}{\text{C}}-\text{X}'$ or $-\text{X}'-\underset{\text{R}_n}{\text{C}}=$, where R_n
 33
 34

35 is $-\text{R}_1$, $-\text{OR}_1$, $-\text{SR}_1$, $-\text{F}$, $-\text{NHR}_2$, $-\text{Br}$ or $-\text{I}$;
 36 and X' is X , as defined above; or X' is
 37 $>\text{C}=\text{O}$;

38 and

39 III. Z'' is defined as follows:

40 A) Z'' is Y , where Y is $-\overset{\text{R}_1}{\text{O}}-$, $-\text{N}-$, $>\text{CHR}_1$,
 41
 42
 43 $>\overset{\text{R}_1}{\text{C}}=\text{O}$, $>\overset{\text{R}_1}{\text{C}}-(\text{CH}_2)_n\text{OR}_2$,
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73 or

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B) Z'' is $-Y-CH-$ or $-CH-Y-$ where R_p

$$\begin{array}{c} | \quad \quad | \\ R_p \quad R_p \end{array}$$

77

is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I$;

78 and

79

IV. provided that when each $R_b, R_c, R_d, R_e, R_i, R_j, R_k,$

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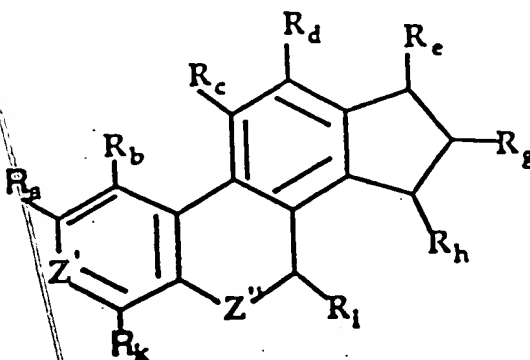
R_l, R_m and R_o is H;

81

R_f is $-CH_3$;

82 R_g is $-OH$;
83 Z' is $>COH$; and
84 Z'' is $>CH_2$;
85 then R_a is not $-H$;
86 where, in each formula set forth above, each R_1 and R_2
87 independently is $-H$, or substituted or unsubstituted alkyl,
88 alkenyl or alkynyl group of 1-6 carbons.

1 2. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
5 being administered in an amount sufficient to inhibit cell
6 mitosis:



8 wherein:

9 I. R_a-R_k are defined as follows:

10 A) each $R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k$
11 independently is $-R_1, -OR_1, -OCOR_1, -SR_1,$
12 $-F, -NHR_2, -Br, \text{ or } -I$; and R_e is $-R_1, -OR_1,$
13 $-OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or $-C\equiv CH$;

14 or

15 B) each R_a, R_b, R_c, R_d, R_k , independently is
16 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, \text{ or }$
17 $-I$; and each R_e, R_g, R_h, R_i , independently is
18 $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, \text{ or }$
19 $-I$; and R_e is $=O, -R_1, -OR_1, -OCOR_1, -SR_1,$
20 $-F, -Br, -I$ or $-C\equiv CH$;

21 and

22 II. Z' is defined as follows:

23 A) Z' is X , where X is $>COR_1, >CC-R_1,$
24
25

26 $\begin{array}{ccc} O & OH & OH \\ | & | & | \\ >CC-OR_1 & >CC-R_1 & >C-C-OR_1; \end{array}$
27
28

29 or

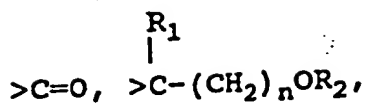
30 B) Z' is $=C-X'-$ or $-X'-C=$, where R_n
31 $\begin{array}{c} | \\ R_n \end{array}$ $\begin{array}{c} | \\ R_n \end{array}$
32
33 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I$,
34 and X' is X , as defined above;
35 or X' is also $>C=O$;

36 and

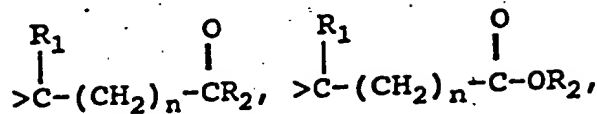
37 III. Z'' is defined as follows:

38 A) Z'' is Y , where Y is $-O-, -N-, >CHR_1,$
39 $\begin{array}{c} R_1 \\ | \end{array}$
40

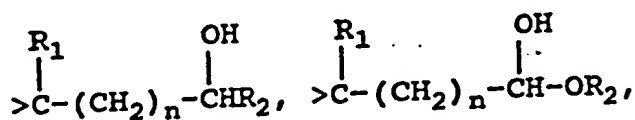
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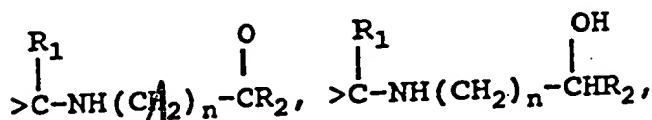
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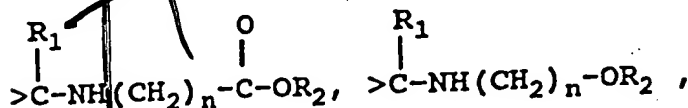
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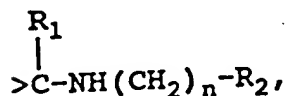
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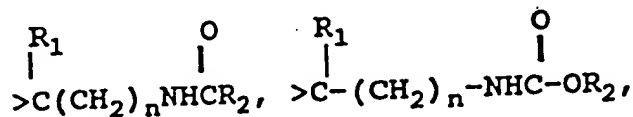
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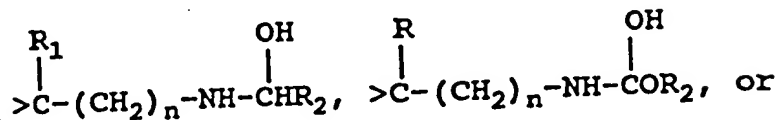
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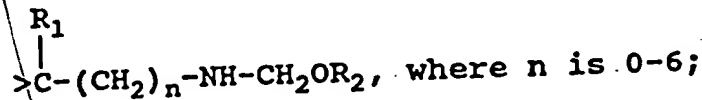
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71 or

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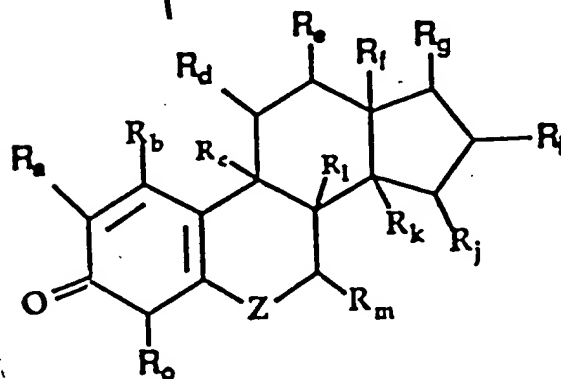
B) Z" is -Y-CH- or -CH-Y-, where R_p is

$$\begin{array}{c} \text{R}_p \\ | \end{array} \quad \begin{array}{c} \text{R}_p \\ | \end{array}$$

 -R₁, -OR₁, -SR₁, -F, -NHR₂, -Br or -I;

76 where, in each formula set forth above, each R_1 and R_2
77 independently is -H, or substituted or unsubstituted alkyl,
78 alkenyl or alkynyl group of 1-6 carbons.

1 3. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
5 being administered in an amount sufficient to inhibit cell
6 mitosis:



8 wherein:

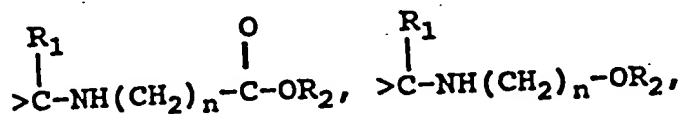
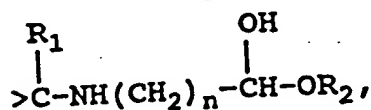
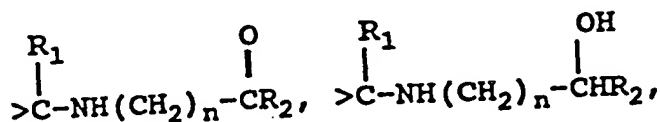
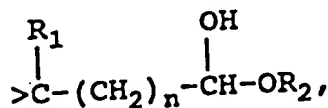
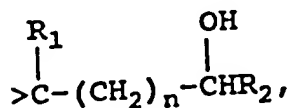
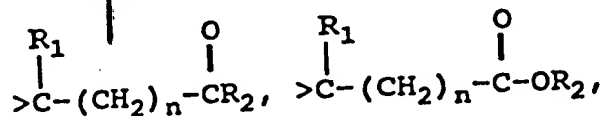
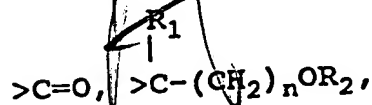
9 I. R_a - R_o are defined as follows:
10 A) each R_a , R_b , R_c , R_d , R_e , R_f , R_i , R_j , R_k , R_l ,
11 R_m , R_o independently is - R_1 , - OR_1 , - $OCOR_1$,
12 - SR_1 , -F, - NHR_2 , -Br, or -I; and R_g is - R_1 ,
13 - OR_1 , - $OCOR_1$, - SR_1 , -F, - NHR_2 , -Br, -I or
14 - $C\equiv CH$;

15 or
 16
 17 B) each $R_a, R_b, R_c, R_f, R_k, R_l$, independently
 18 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
 19 or $-I$; and each $R_d, R_e, R_i, R_j, R_m, R_o$
 20 independently is $=O, -R_1, -OR_1, -OCOR_1,$
 21 $-SR_1, -F, -NHR_2, -Br, -I$; and R_g is $=O,$
 22 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$
 23 or $-C\equiv CH$;

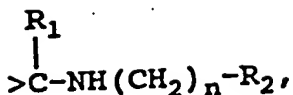
23 and

24 II. Z is defined as follows:

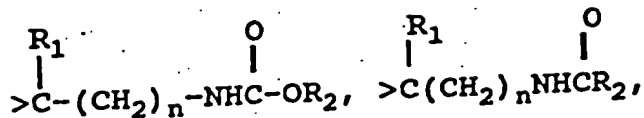
25 A) Z is Y, where Y is $-O-, -N-, >CHR_1,$
 26
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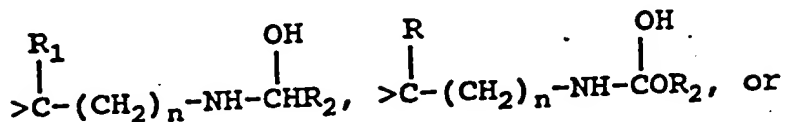
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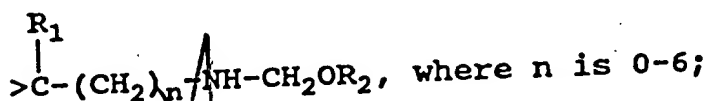
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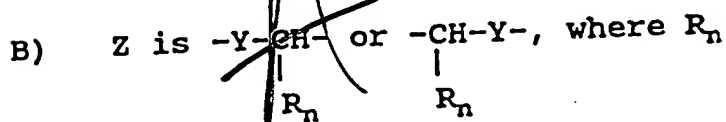


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62 or

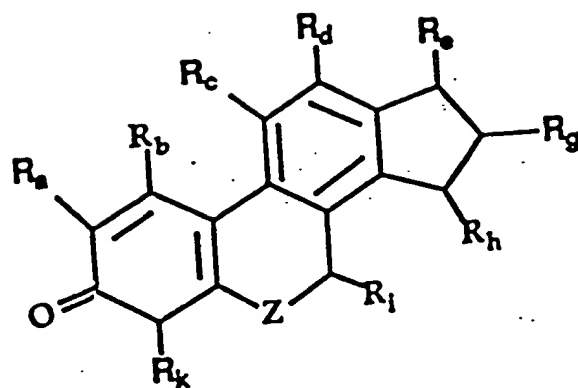
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is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;
where, in each formula set forth above, each R_1 and R_2
independently is $-H$, or substituted or unsubstituted alkyl,
alkenyl or alkynyl group of 1-6 carbons.

1 4. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
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6 mitosis:



7 wherein:

8 I. R_a-R_k are defined as follows:

9 A) each $R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k$
 10 independently is $-R_1, -OR_1, -OCOR_1, -SR_1,$
 11 $-F, -NHR_1, -Br, \text{ or } -I$; and R_e is $-R_1, -OR_1,$
 12 $-OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$ or $-C\equiv CH$;

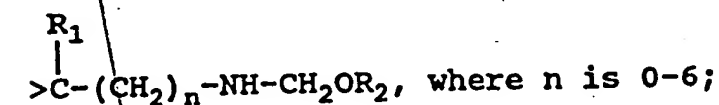
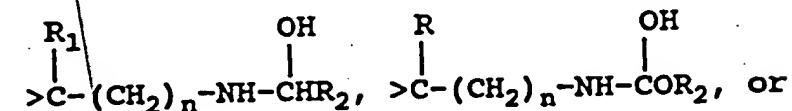
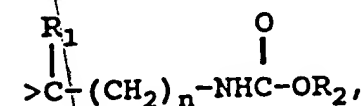
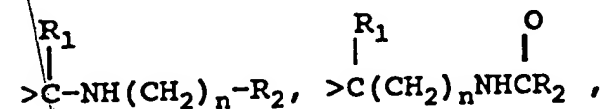
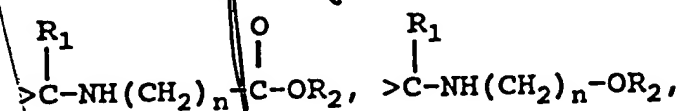
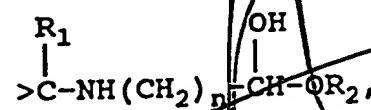
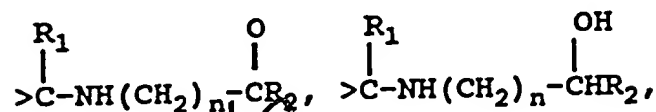
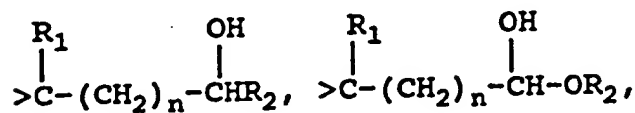
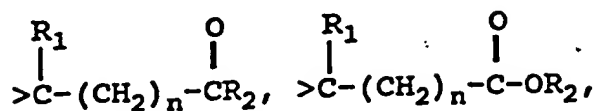
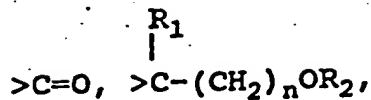
13 or

14 B) each R_a, R_b, R_c, R_d independently is $-R_1,$
 15 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, \text{ or } -I$
 16 and each R_g, R_h, R_i, R_k independently is
 17 $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$
 18 or $-I$; and R_e is $=O, -R_1, -OR_1, -OCOR_1,$
 19 $-SR_1, -F, -NHR_1, -Br, -I$ or $-C\equiv CH$;

20 and

21 II. Z is defined as follows:

22
23
24 A) Z is Y, where Y is -O- , -N- , >CHR_1 ,

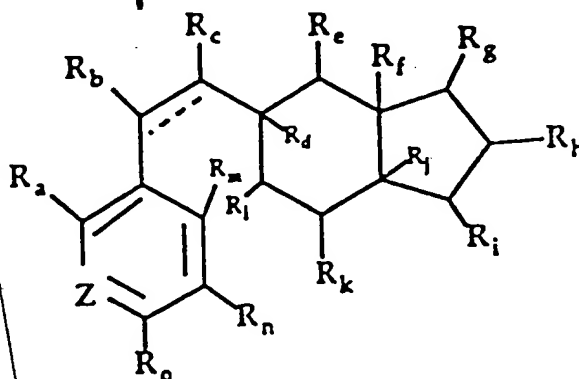


55 or

56 B) Z is -Y-CH- or -CH-Y- , where R_n
57
58

59 is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;
60 where, in each formula set forth above, each R_1 and R_2
61 independently is $-H$, or substituted or unsubstituted alkyl,
62 alkenyl or alkynyl group of 1-6 carbons.

1 5. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
5 being administered in an amount sufficient to inhibit cell
6 mitosis:
7



8 wherein:

9 I. R_a-R_o are defined as follows:

10 A) each R_a , R_b , R_c , R_d , R_e , R_f , R_g , R_h , R_j , R_k ,
11 R_l , R_m , R_n , R_o independently is $-R_1$, $-OR_1$,
12 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_i
13 is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$,
14 $-I$ or $-C\equiv CH$;

15 or

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23 or

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B) each $R_a, R_d, R_f, R_j, R_m, R_n, R_o$ independently is $-R_1, -OR_1, -OCR_1, -SR_1, -F, -NHR_2, -Br, \text{ or } -I$; and each $R_b, R_c, R_e, R_g, R_h, R_k, R_l$ independently is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or $-I$; and R_i is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, -I$ or $-C\equiv CH$;

23 or

24

25

26

27

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29

30

C) each $R_a, R_b, R_c, R_d, R_f, R_j, R_m, R_n, R_o$ independently is $-R_1, -OR_1, -OCR_1, -SR_1, -F, -NHR_2, -Br, -I$ and each R_e, R_g, R_h, R_k, R_l independently is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or $-I$; and R_i is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, -I$ or $-C\equiv CH$;

31

II. Z is defined as follows:

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A) Z is X, where X is $>COR_1, >\overset{O}{\underset{|}{CC}}-R_1, >\overset{O}{\underset{|}{CC}}-OR_1,$

35

36

37

$\overset{OH}{\underset{|}{>CC}}-R_1, \overset{OH}{\underset{|}{>CC}}-OR;$

38 or

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40
41

B) Z is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_p \end{array}$, where R_p

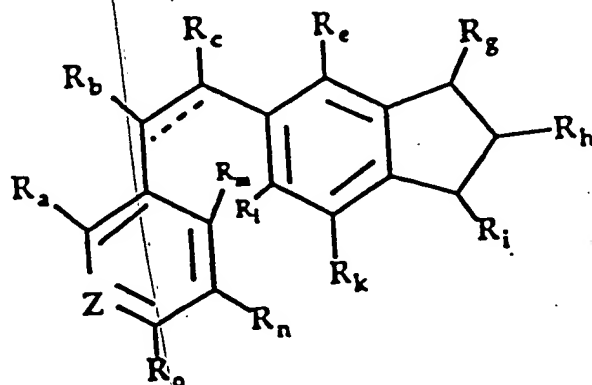
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is $-\text{R}_1$, $-\text{OR}_1$, $-\text{SR}_1$, $-\text{F}$, $-\text{NHR}_2$, $-\text{Br}$ or $-\text{I}$;
and X' is X , as defined above;
or X' is $>\text{C}=\text{O}$;

45 where, in each formula set forth above, each R_1 and R_2
46 independently is $-\text{H}$, or substituted or unsubstituted alkyl,
47 alkenyl or alkynyl group of 1-6 carbons; and the bond
48 indicated by $\text{C}\bullet\bullet\bullet\text{C}$ is absent or, in combination with the $\text{C}-\text{C}$
49 bond, is the unit $\text{HC}=\text{CH}$.

1 6. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
5 being administered in an amount sufficient to inhibit cell
6 mitosis:

7



8 wherein:

9 I. R_a-R_o are defined as follows:

10 A) each $R_a, R_b, R_c, R_e, R_g, R_h, R_k, R_l, R_m, R_n,$
 11 R_o independently is $-R_1, -OR_1, -OCOR_1,$
 12 $-SR_1, -F, -NHR_2, -Br, \text{ or } -I$; and R_1 is $-R_1,$
 13 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or
 14 $-C\equiv CH$;

15 or

16 B) each $R_a, R_e, R_l, R_m, R_n, R_o$ independently
 17 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
 18 $-I$ and each R_b, R_c, R_g, R_h is $=O, -R_1,$
 19 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or $-I$;
 20 and R_1 is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F,$
 21 $-NHR_1, -Br, -I$ or $-C\equiv CH$;

22 or

23 C) each $R_a, R_b, R_c, R_e, R_k, R_m, R_n, R_o$
 24 independently is $-R_1, -OR_1, -OCOR_1, -SR_1,$
 25 $-F, -NHR_2, -Br, -I$, and each R_h, R_l
 26 independently is $=O, -R_1, -OR_1, -OCOR_1,$
 27 $-SR_1, -F, -NHR_1, -Br$ or $-I$; and R_1 is $=O,$
 28 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$
 29 or $-C\equiv CH$;

30 and

31 I. Z is defined as follows:

32 A) Z is X , where X is $>COR_1, >CC-R_1, >CC-OR_1,$
 33
 34



38 or

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41

B) Z is $\begin{array}{c} \text{=C-X'-} \\ | \\ R_p \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ R_p \end{array}$, where R_p

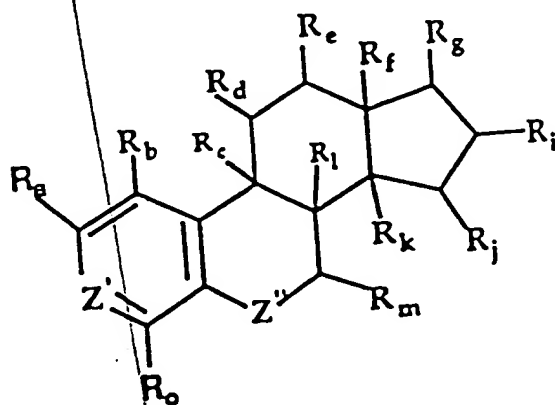
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is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$,
and X' is X , as defined above;
or X' is $=O$;

45 where, in each formula set forth above, each R_1 and R_2
46 independently is $-H$, or substituted or unsubstituted alkyl,
47 alkenyl or alkynyl group of 1-6 carbons; and the bond
48 indicated by $C \cdots C$ is absent or, in combination with the $C-C$
49 bond is the unit $HC=CH$.

1
2
3

7. A compound of the general formula below, said
compound being a cell-mitosis-inhibiting compound:



4 wherein:

5 I. R_a-R_o are defined as follows:

6 (A) each $R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l,$
7 R_m, R_o , independently is $-R_1, -OR_1,$
8 $-OCOR_1, -SR_1, -F, -NHR_2, -Br$, or $-I$; and R_g
9 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
10 $-I$ or $-C\equiv CH$;

11 or

12 (B) each $R_a, R_b, R_c, R_f, R_k, R_l, R_o$, is $-R_1,$
13 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br$, or $-I$;
14 and each R_d, R_e, R_i, R_j, R_m , independently
15 is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2,$
16 $-Br$ or $-I$; and R_g is $=O, -R_1, -OR_1, -OCOR_1,$
17 $-SR_1, -F, -NHR_2, -Br, -I$ or $-C\equiv CH$;

18 and

19 II. Z' is defined as follows:

20 A) Z' is X, where X is $\overset{O}{\parallel} >COR_1, \overset{O}{\parallel} >CC-R_1,$
21
22

23 $\overset{O}{\parallel} >CC-OR_1, \overset{OH}{\parallel} >CC-R_1, \overset{OH}{\parallel} >CC-OR_1;$
24
25

26 or

27 B) Z' is $\begin{array}{c} =C-X' \\ | \\ R_n \end{array}$ or $\begin{array}{c} -X'-C= \\ | \\ R_n \end{array}$, where R_n
28
29

30 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I$;
31 or X' is X, as defined above; or
32 X' is $>C=O$;

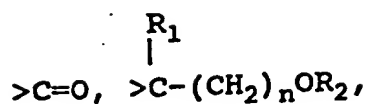
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34 III. Z'' is defined as follows:

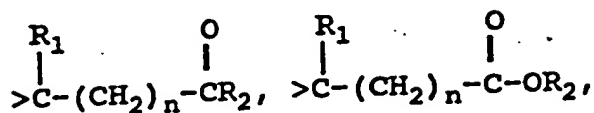
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A) z'' is Y, where Y is $-O-$, $-N-$, $>CHR_1$,

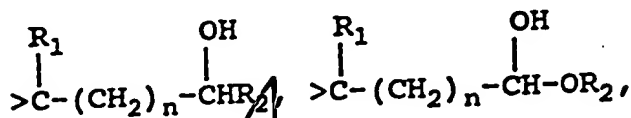
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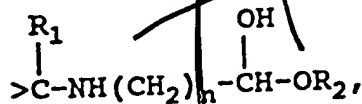
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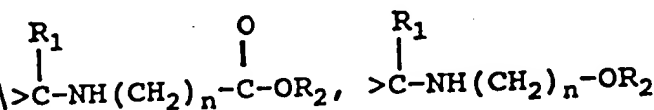
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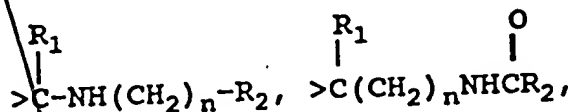
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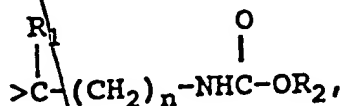
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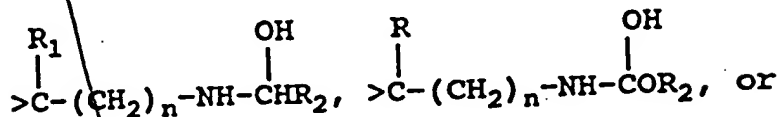
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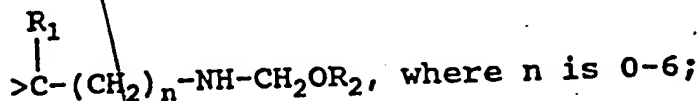
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68 or

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B) z'' is $-Y-CH-$ or $-CH-Y-$ where R_p

$$\begin{array}{c} R_p \quad R_p \\ | \quad | \end{array}$$

72 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I$;

73 provided that when:

74 3) each $R_b, R_c, R_d, R_e, R_j, R_k, R_l, R_m$ is $-H$;
75 R_f is $-CH_3$;

76 R_g is $-OH, -OCCH_3$;
77 R_i is $-H, -OH$, or $=O$;

78 R_o is $-H$ or $-Br$;

79 Z' is $>COH$; and

80 Z'' is $>CH_2$ or $-OH$; then
81 R_a is not $-F, -Br, -OH$ or $-H$;

82 and

83 and

84 4) each $R_b, R_c, R_d, R_e, R_l, R_j, R_k, R_l$,
85 R_m is $-H$;

86 R_f is $-CH_3$;

87 R_g is $-OH$; and

88 Z'' is $>CH_2$; then

89 Z' is not $>COCH_3$ or $>COCCH_3$; and
90 each R_a, R_o independently or together are
91 not $-OCH_3$ or $-H$;

92 and

93 5) each $R_c, R_e, R_j, R_k, R_l, R_m, R_o$ is $-H$;

94 R_a is $-H$ or $-OCH_3$;

95 R_b is $-H$ or $-CH_3$;

96 R_d is $-OH$;

97 R_f is $-CH_3$;

98 R_g is $=O$;

99 R_i is $-OH, =O$ or $-C\equiv CH$; and

100 Z'' is $>CH_2$; then

101 Z' is not $>COH, >COCCH_3$, or $-H$;

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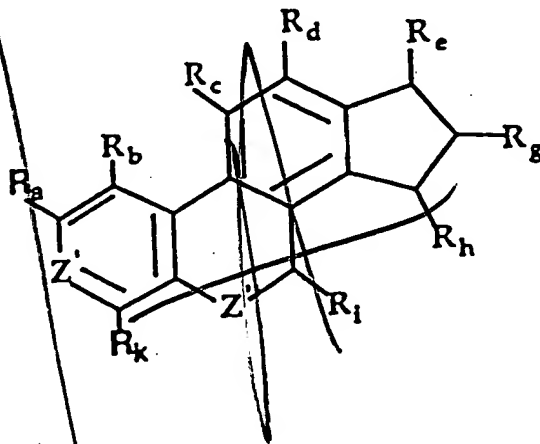
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107 where, in each formula set forth above, each R_1 and R_2
108 independently is -H, or substituted or unsubstituted alkyl,
109 alkenyl or alkynyl group of 1-6 carbons.

1 8. A compound of the general formula below, said
2 compound being a cell-mitosis-inhibiting compound:

3



4 wherein:

5 I. R_a - R_k are defined as follows:

6 A) each R_a , R_b , R_c , R_d , R_g , R_h , R_i , R_k
7 independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$,
8 $-F$, $-NHR_2$, $-Br$, or $-I$; and R_e is $-R_1$, $-OR_1$,
9 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ or $-C\equiv CH$;

10 or

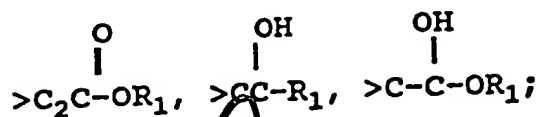
11 B) each R_a , R_b , R_c , R_d , R_k , is $-R_1$, $-OR_1$,
12 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and
13 each R_g , R_h , R_i , independently is $=O$,

$-R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, \text{ or } -I;$
 and R_e is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F,$
 $-Br, -I$ or $-C\equiv CH;$

and

I. Z' is defined as follows:

A) Z' is X, where X is $>COR_1, >C_2C-R_1,$



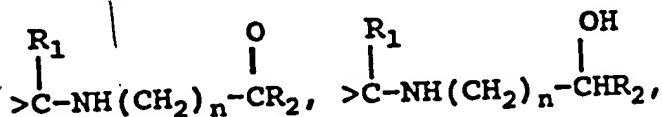
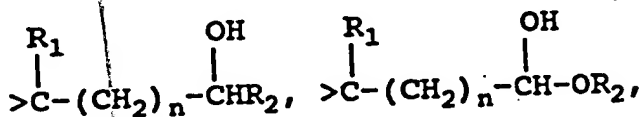
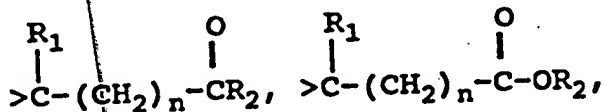
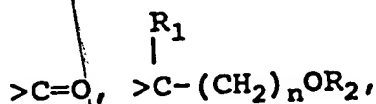
or

B) Z' is $=C-X'-$ or $-X'-C=$, where R_n
 $\begin{array}{c} R_n \\ | \\ >C-X'- \\ | \\ R_n \end{array}$ or $\begin{array}{c} R_n \\ | \\ -X'-C= \\ | \\ R_n \end{array}$
 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I,$
 and X' is X, as defined above;
 or X' is also $>C=O;$

and

II. Z'' is defined as follows:

A) Z'' is Y, where Y is $-O-, -N-, >CHR_1,$



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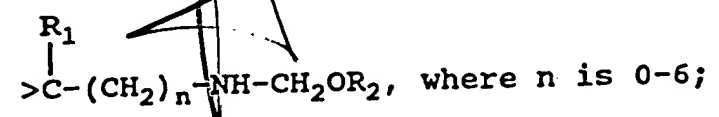
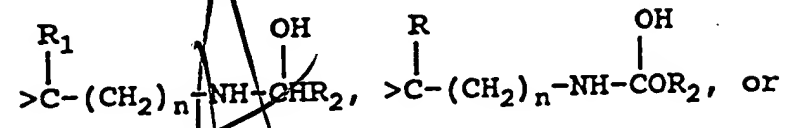
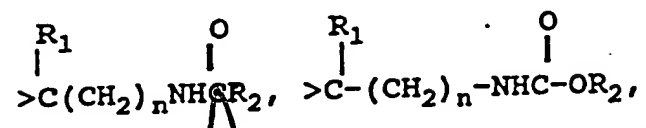
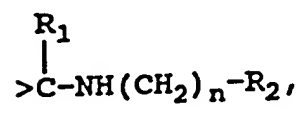
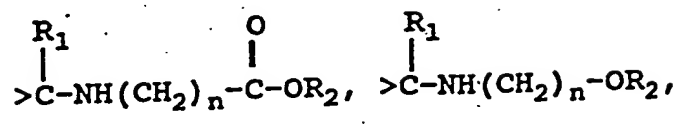
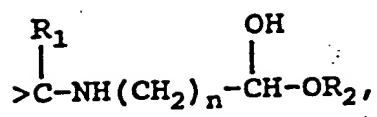
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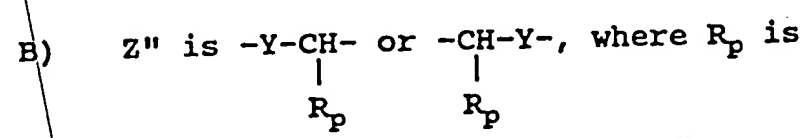
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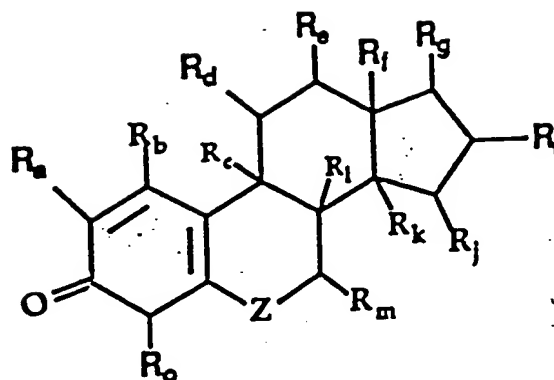
or



$-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I;$

where, in each formula set forth above, each R_1 and R_2 independently is $-H$, or substituted or unsubstituted alkyl, alkenyl or alkynyl group of 1-6 carbons.

9. A compound of the general formula below, said compound being a cell-mitosis-inhibiting compound:



3 wherein:

4 I. R_a-R_o are defined as follows:

5 A) each $R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l,$
 6 R_m, R_o independently is $-R_1, -OR_1, -OCOR_1,$
 7 $-SR_1, -F, -NHR_2, -Br, \text{ or } -I$; and R_g is $-R_1,$
 8 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or
 9 $-C\equiv CH$;

10 or

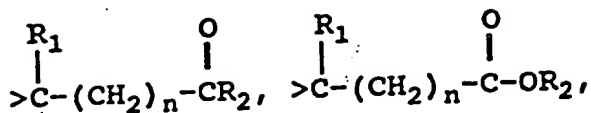
11 B) each $R_a, R_b, R_c, R_f, R_k, R_l$, independently
 12 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
 13 or $-I$; and each $R_d, R_e, R_i, R_j, R_m, R_o$
 14 independently is $=O, -R_1, -OR_1, -OCOR_1,$
 15 $-SR_1, -F, -NHR_2, -Br, -I$; and R_g is $=O,$
 16 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$
 17 or $-C\equiv CH$;

18 and

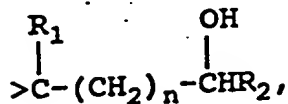
19 II. Z is defined as follows:

20 A) Z is Y , where Y is $-O-, \overset{R_1}{|} -N-, >CHR_1,$
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 23 $>C=O, \overset{R_1}{|} >C-(CH_2)_nOR_2,$
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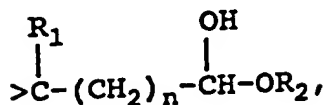
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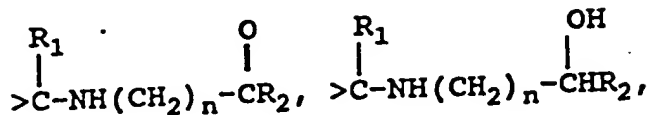
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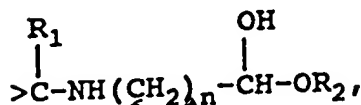
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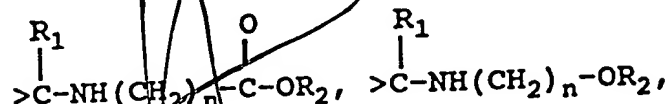
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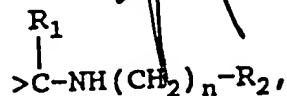
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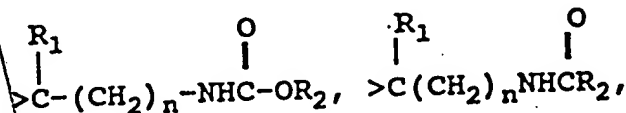
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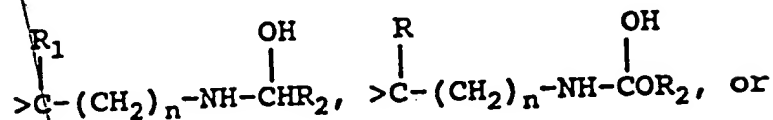
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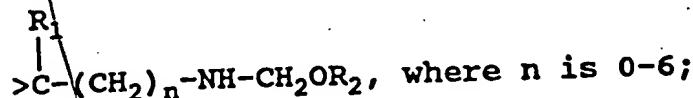
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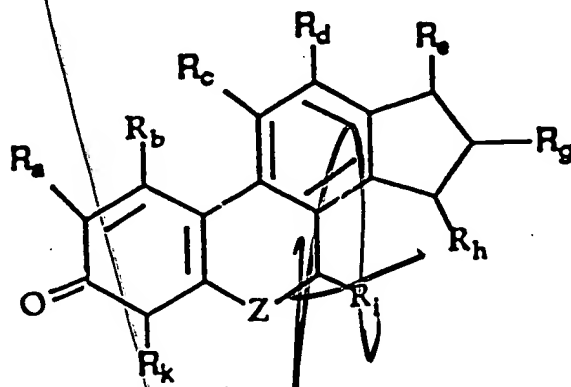
B) Z is $\begin{array}{c} -Y-CH- \\ | \\ R_n \end{array}$ or $\begin{array}{c} -CH-Y- \\ | \\ R_n \end{array}$, where R_n

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is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;

62 where, in each formula set forth above, each R_1 and R_2
63 independently is -H, or substituted or unsubstituted alkyl,
64 alkenyl or alkynyl group of 1-6 carbons.

1 10. A compound of the general formula below, said
2 compound being a cell-mitosis-inhibiting compound:



4 wherein:

5 I. R_a - R_k are defined as follows:

6 A) each R_a , R_b , R_c , R_d , R_g , R_h , R_i , R_k
7 independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$,
8 $-F$, $-NHR_1$, $-Br$, or $-I$; and R_e is $-R_1$, $-OR_1$,
9 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

10 or

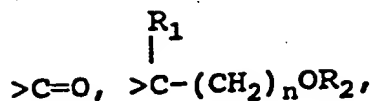
11 B) each R_a , R_b , R_c , R_d , independently is $-R_1$,
12 $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, or $-I$;
13 and each R_g , R_h , R_i , R_k independently is
14 $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$
15 or $-I$; and R_e is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$,
16 $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

17 II. Z is defined as follows:

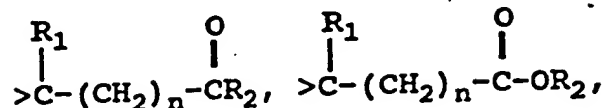
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1) Z is Y, where Y is -O- , -N- , >CHR_1 ,

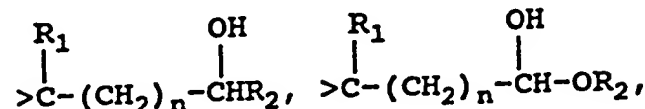
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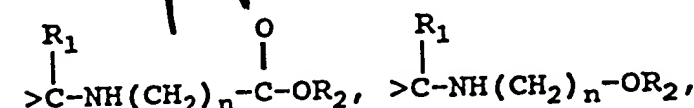
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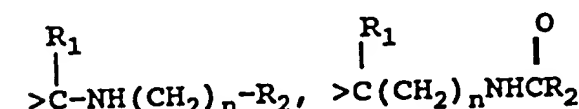
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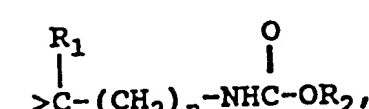
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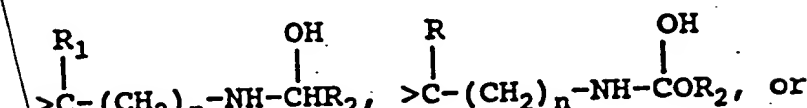
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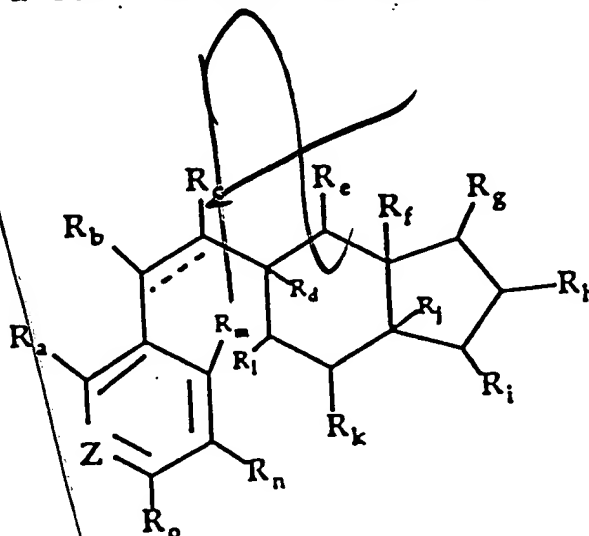
51 or

52 Z is $-Y-CH-$ or $-CH-Y-$, where R_n
 53 $\quad \quad \quad | \quad \quad \quad |$
 54 $\quad \quad \quad R_n \quad \quad R_n$

55 is $-R_1$, $-OR_1$, $-SR_1$, $-F$,
 56 $-NHR_2$, $-Br$ or $-I$;

57 where, in each formula set forth above, each R_1 and R_2
 58 independently is $-H$, or substituted or unsubstituted alkyl,
 59 alkenyl or alkynyl group of 1-6 carbons.

1 11. A compound of the general formula below, said
 2 compound being a cell-mitosis-inhibiting compound:



4 wherein:

5 I. R_a-R_o are defined as follows:

6 A) each R_a , R_b , R_c , R_d , R_e , R_f , R_g , R_h , R_j , R_k ,
 7 R_l , R_m , R_n , R_o independently is $-R_1$, $-OR_1$,
 8 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_i
 9 is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$,
 10 $-I$ or $-C\equiv CH$;

11 or

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18

19 or

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B) each $R_a, R_d, R_f, R_j, R_m, R_n, R_o$ independently is $-R_1, -OR_1, -OCR_1, -SR_1, -F, -NHR_2, -Br, -I$; and each $R_b, R_c, R_e, R_g, R_h, R_k, R_l$ independently is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or $-I$; and R_i is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$ or $-C\equiv CH$;

C) each $R_a, R_b, R_c, R_d, R_f, R_j, R_m, R_n, R_o$ independently is $-R_1, -OR_1, -OCR_1, -SR_1, -F, -NHR_2, -Br, -I$; and each R_e, R_g, R_h, R_k, R_l independently is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or $-I$; and R_i is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$ or $-C\equiv CH$;

27 and

28 I. Z is defined as follows:

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30

31

1) Z is X, where X is $>COR_1, >\overset{O}{\underset{|}{CC}}-R_1, >\overset{O}{\underset{|}{CC}}-OR_1,$

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33

34

$>\overset{OH}{\underset{|}{CC}}-R_1, >\overset{OH}{\underset{|}{CC}}-OR; \text{ or}$

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36
37

Z is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_p \end{array}$, where R_p

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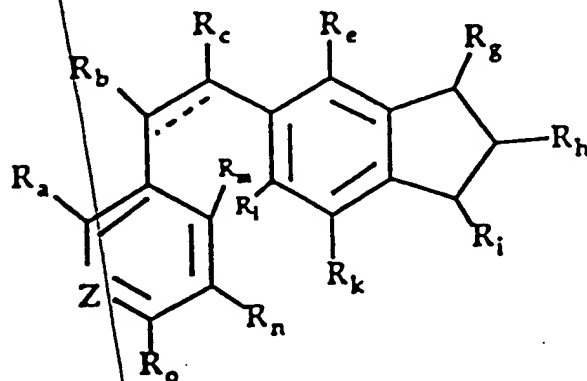
is $-\text{R}_1$, $-\text{OR}_1$, $-\text{SR}_1$, $-\text{F}$, $-\text{NHR}_2$, $-\text{Br}$ or $-\text{I}$;
and X' is X , as defined above;
or X' is $>\text{C}=\text{O}$;

41 where, in each formula set forth above, each R_1 and R_2
42 independently is $-\text{H}$, or substituted or unsubstituted alkyl,
43 alkenyl or alkynyl group of 1-6 carbons; and the bond
44 indicated by $\text{C}\bullet\bullet\bullet\text{C}$ is absent or, in combination with the $\text{C}-\text{C}$
45 bond is the unit $\text{HC}=\text{CH}$.

1
2

12. A compound of the general formula below, said
compound being a cell-mitosis-inhibiting compound:

3



4 wherein:

5 I. R_a-R_o are defined as follows:

6 A) each $R_a, R_b, R_c, R_e, R_g, R_h, R_k, R_l, R_m, R_n,$
 7 R_o independently is $-R_1, -OR_1, OCOR_1, -SR_1,$
 8 $-F, -NHR_2, -Br, \text{ or } -I$; and R_i is $-R_1, -OR_1,$
 9 $-OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or $-C\equiv CH$;

10 or

11 B) each $R_a, R_e, R_l, R_m, R_n, R_o$ independently
 12 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
 13 $-I$; and each R_b, R_c, R_g, R_h is $=O, -R_1,$
 14 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or $-I$;
 15 and R_i is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F,$
 16 $-NHR_1, -Br, -I$ or $-C\equiv CH$;

17 or

18 C) each $R_a, R_b, R_c, R_e, R_k, R_m, R_n, R_o$
 19 independently is $-R_1, -OR_1, OCOR_1, -SR_1,$
 20 $-F, -NHR_2, -Br, -I$; and each R_g, R_h
 21 independently is $=O, -R_1, -OR_1, -OCOR_1,$
 22 $-SR_1, -F, -NHR_1, -Br$ or $-I$; and R_i is $=O,$
 23 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$
 24 or $-C\equiv CH$;

25 and

26 II. Z is defined as follows:

27 A) Z is X , where X is $>COR_1, >\overset{O}{\underset{|}{CC}}-R_1, >\overset{O}{\underset{|}{CC}}-OR_1,$
 28
 29

30 $>\overset{OH}{\underset{|}{CC}}-R_1, >\overset{OH}{\underset{|}{CC}}-OR;$
 31
 32

33 or

34 B) Z is $=C-X'-$ or $-X'-C=$, where R_p
 35 $\underset{|}{R_p}$ $\underset{|}{R_p}$
 36

37

is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$,

38

and X' is X , as defined above;

39

or X' is $=O$;

40

where, in each formula set forth above, each R_1 and R_2

41

independently is $-H$, or substituted or unsubstituted alkyl,

42

alkenyl or alkynyl group of 1-6 carbons; and the bond

43

indicated by $C \cdots C$ is absent or, in combination with the $C-C$

44

bond is the unit $HC=CH$.

1

13. The method of claim 1, wherein said

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cell-mitosis-inhibiting composition is 2-methoxyestradiol.

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14. The method of claim 1, wherein said

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cell-mitosis-inhibiting composition is 2-fluoroestradiol.

1

15. The method of claim 1, wherein said

2

cell-mitosis-inhibiting composition is 2-bromoestradiol.

1

16. The method of claim 1, wherein said

2

cell-mitosis-inhibiting composition is 2-methoxyestrone.

1

17. The method of claim 1, wherein said cell-

2

mitosis-inhibiting composition is 17-ethynylestradiol.

1

18. The method of claims 1 or 2 wherein said

2

compound is further characterized in that

3

A) Z' is $=C-X'$ or $-X'-C=$; and

4

 R_n R_n

5

6

 Z'' is $-Y-CH-$ or $-CH-Y-$; or

7

 R_p R_p

8

9

B) Z' is X ; and Z'' is $-Y-CH-$ or $-CH-Y-$; or

10

 R_p R_p

11

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13
14

c) Z' is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_n \end{array}$; and Z" is Y.

1 19. The method of claims 3 or 4 wherein said
2 compound is further characterized in that Z is
3 $\begin{array}{c} \text{-Y-CH-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ \text{R}_n \end{array}$.
4
5

1 20. The method of claims 5 or 6 wherein said
2 compound is further characterized in that Z is
3 $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_p \end{array}$.
4
5

1 21. The compound of claims 7 or 8, wherein said
2 compound is further characterized in that

3 A) Z' is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_n \end{array}$; and
4
5

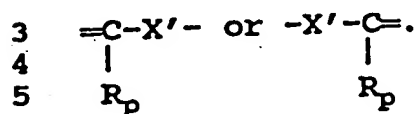
6 Z" is $\begin{array}{c} \text{-Y-CH-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ \text{R}_p \end{array}$; or
7
8

9 B) Z' is X; and Z" is $\begin{array}{c} \text{-Y-CH-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ \text{R}_p \end{array}$; or
10
11

12 c) Z' is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_n \end{array}$; and Z" is Y.
13
14

1 22. The compound of claims 9 or 10, wherein said
2 compound is further characterized in that Z is
3 $\begin{array}{c} \text{-Y-CH-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ \text{R}_n \end{array}$.
4
5

1 23. The compound of claims 11 or 12, wherein said
2 compound is further characterized in that Z is



1 24. The method of any one of claims 1-6, wherein at
2 least one of $\text{R}_a \rightarrow \text{R}_p$ is $-\text{OCH}_3$.

1 25. The compound of any one of claims 7-12, wherein
2 at least one of $\text{R}_a \rightarrow \text{R}_p$ is $-\text{OCH}_3$.

Add
A1

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